FORENSIC SCIENCE
VI SEMESTER DATE – 24th APRIL

Compiled by -ANJALI GUPTA
ASSISTANT PROFESSOR
FORENSIC SCEINCE
BTIE, SAGAR

INJURY

Introduction

- In medical jargon, injury is used synonyms with trauma or wound but their meaning is not same.
- An injury is any damage to any part of the body due to application of mechanical force.
- Wound is defined the forcible solution of the continuity of any tissue of body by mechanical force.
- Trauma is an insult to the state of well-being and the insult may be physical or mental.

Perception of injury to medical man is different from a legal professional. The definition of injury given above is sufficient for medical man. However, legally injury will include "any lesion, external or internal caused by violence, with or without breach of continuity of skin".
Thus, the legal conception of wound is more extensive than medical one. Wound has neither been defined nor been included in any of the statues of law in India. In place of ambiguous term wound, law uses the term 'hurt'.

Hurt means, "Whoever causes bodily pain, disease or infirmity to any person is said to cause hurt (Section 319 of IPC).

Definition and features Section 44 of IPC defines injury as "any harm caused illegally to a person in body, mind, reputation or property".

This definition of injury has wider meaning. It has not only included bodily harm but also incorporated mental suffering and harm caused to reputation or property.

Use of term "illegal": here the word illegal is included in definition.

The implications of this inclusion are that not all injuries caused are illegal. It means, there are some injuries, which are legal for example, if surgeon is doing operation; he inflicts surgical incision over patient with consent. Here, the surgical incision is not an illegal injury because it is caused for the benefit of patient.

Classification Injuries are classified in many ways such as:

I) According to Causative Forces

A) Mechanical injuries

1. **Blunt force injuries** – Abrasion – Contusion – Laceration – Fracture and dislocations of teeth/bone

2. **Sharp-edged weapon injuries** – Incised wounds – Chop wounds

3. **Piercing weapons** – stab wounds

4**. Firearm weapons** – firearm wounds.

B) Thermal Injuries

1. **Due to cold**

– Frost bite – Trench foot

– Immersion foot 2. Due to heat

– Burns – Scalds

C) Chemical injuries

1. **Corrosion** – corrosive acid/alkali/metal salts

2. **Irritation** – weak acids or alkali

D) Miscellaneous injuries

1**. Electricity**

2. **Lightning**

3. **X-rays**

4**. Radioactive substances**.

FORENSIC SCIENCE
IV SEMESTER
UNIT- IV
INK & ITS EXAMINATION

WRITTEN BY: SHIVANGI GUPTA

INTRODUCTION OF INK

Ink is a type of colored liquid which is used to produce colored surface in different fields like a painting image, text or any kind of design. The purpose of the ink is to visulise the message. The colour in the ink gives long lasting heat,light,water resistance property.
Determining ink sources used on a variety of documents is a key priority for forensic document examiners. The ability to distinguish different inks can be quite useful for several reasons. Document alteration (e.g., at a date later than indicated) by writing with a pen of similar color but different dye composition is one specific example when ink differentiation is crucial in criminal cases. Ink comparison also can determine the relationship between two samples in a forgery case that involves an original and a copy or two documents believed to have the same author. Sample authentication also can be tested based on ink analysis of raw colorant materials available during a specific historical period. To unambiguously identify specific inks, data interpretation is simplified if a chemical-separation step precedes detection of various components in ink formulations.

COMPOSITION OF INK

Inks are complex mixtures of colorants, vehicles, and additives, which are adjusted in composition to produce the desired writing characteristics.
Colorants are compounds that give ink the desired color and can include any or all of the following chemical classifications: pigments and/or acidic, basic, azoic, direct, disperse, reactive, and solvent dyes. Colorants are often the focus of ink analysis because of their light-absorption and emission properties that can be detected by various analytical methods.
Vehicles or carriers are usually solvents that allow the ink to flow and carry the colorants to the material surface. Solvents are the typical ingredients analyzed in date-of-origin investigations because of their gradual evaporation from a document.
Additives can serve as flow (viscosity) modifiers, surface activators, corrosion controllers, solubility enhancers, and preservatives. Detection of these additive compounds can greatly aid forensic examiners because the compounds can be manufacturer-specific. Their identity is often a highly guarded secret in ink formulations, as are the colorants themselves.

TYPES OF INK

CARBON INK/ INDIAN INK/ MESI INK- It was invented around 34BC in China. It is prepared from burn bones and other such tar or carbonated plant. It is suspended in animal glue which acts as vehicle. It is used as the base of the ink. It is also prepared by amorphorous carbon in the form of lamp leg made into cake with high glue. The color may vary depending upon the soot

Before starting the examination, always the non destructive methods are used in examination of ink because it can preserve the original sample and that can be further analysis.

Physical examination

This includes the optical examination of ink with the help of hand magnifier or compound microscope to determine:

1. The type of ink used(ball point pen, fountain pen or fiber tip etc)
2. Color of ink
3. Comparison of secondary color shades, ultraviolet rays are used to compare the degree of fluorescence.
4. Infrared rays are used to differentiate dyes and pigments and especially ball point pen inks.

Chemical examination

If two inks are found same from the physical examination then chemical examination can be avoided, because test results in the alteration of at least some part of the document. The chemical analysis of ink can be conducted in two different ways-

1. Performing chemical spot tests on the punched out fragments of ink strokes or on the ink strokes itself.
2. Chromatographic analysis for isolation and characterizing various dye stuff inks.

Chemical spot tests:

Prior to advance techniques the ink were chemically analyzed and differentiated by chemical spot tests, preformed on the ink itself or on small fragments of ink strokes, punched out from the ink line with the help of scalpel hypodermic needle or punching plate etc. an now these chemical spot test are exchanged by the thin layer chromatography and other sophisticated techniques. However, some cases, the spot test may prove useful for conducting preliminary examination.

Numerous reagents have been suggested by different workers for performing spot tests. The following reagents may serve the purpose.

1. Bromine water : saturated aqueous solution
2. Sodium hydroxide : 2N aqueous solution
3. Hydrochloric acid : 2N aqueous solution
4. Stannous chloride : 10% aqueous solution
5. Sodium hypochlorite : saturated aqueous solution
6. Oxalic acid : 5% aqueous solution

Carbon inks can be distinguished from other writing ink as this ink remains unaltered by the action of reagents.

Logwood ink and iron-nutgall inks can be differentiated with hydrochloric acid test. The logwood inks with these reagents give red or purple – red colour reaction, whereas the iron-nutgall inks give blue or blue green reaction.

Nigrocine inks can be differentiated from the logwood and iron nutgall inks with oxalic acid test. The oxalic acid has little effect on nigrocine, whereas this reagent bleaches the iron nut-gall inks to some extent or it may change colour of logwood and iron nut-gall inks.

Chromatographic analysis of inks:

Principle of chromatography: Chromatography is based on the fact that sample distributes or partitions itself to different extents in two different, immiscible phases, which is described by partition or distribution coefficient, k_d.

K d = conc of sample in phase A/conc. Of sample in phase B

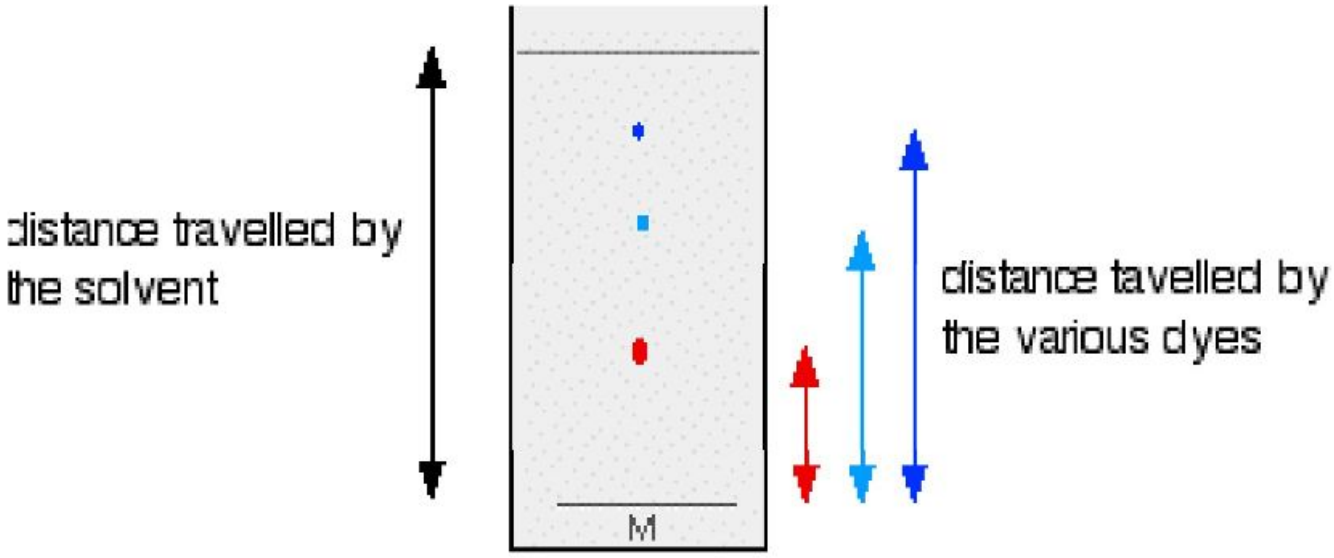
Thin layer chromatography (TLC) is considered to be the most suitable technique for isolating and identifying various components of inks. In these techniques a thin layer plate is prepared by coating a glass plate with silica get or aluminum oxide but the readymade silica gel G plates are available in plate. Depending on the amount of ink deposited on the paper, 1 to 10 plugs of ink are removed with the help of a spatula or hypodermic needle and the ink is dissolved in the minimum quantity of a suitable solvents. A few micro liters of the solution are spotted with a capillary tube onto the layer on the thin layer plate and plate is then placed in a closed jar having selected solvents in fixed ratios. The liquid slowly begins to rise up the plate and when it moves past the sample spot, the components of the sample get separated and get located at different heights. When the liquid phase has moved a sufficient distance the plate is removed from the jar and the Rf value of different spot are recorded.

For differentiation of two inks, their spots are marked on the same TLC plate and if these samples show same number of spots with the same Rf values and colours, then the two inks are identical in their dyes composition otherwise not.

Rf value is defined as the distance travelled by the component divided by the distance travelled by the liquid moving phase.

Different solvent systems for ink analysis:

1. Butanol: ethanol: water – 50:15:10
2. Ethyl acetate: cyclohexane: methanol: ammonia – 70:15:10:5
3. Ethyl acetate: butanol: ammonia – 50:35:5
4. Ethyl acetate: ethanol: water – 70:35:30
5. Toluene: acetate: ethanol: water – 30:60:7:2



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ASSISTANT PROFESSOR
FORENSIC SCEINCE
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RECRUITMENT, TRAINING AND CONDITIONS OF SERVICE

Recruitment

The efficiency of a Department largely depends upon the intellectual and technical qualifications of its incumbents.

- No matter how sound the structural organization or managerial mechanics may be, administrative excellence can never be attained unless the organization is staffed by intelligent and energetic persons.
- If the Police service is manned by qualified, alert, honest and industrious and dedicated persons, its public image and reputation will certainly be of high order.
- Any attempt of reform or reorganization of the existing Police organization, therefore, necessarily presupposes the introduction of a sound and correct recruitment procedure.
- There cannot be any place for inadequate persons in any rational scheme of recruitment.

Problems of Recruitment

- An important problem of recruitment is whether the recruitment should be at one level or at three levels.
- Recruitment in the various Police forces in India takes at three levels.

- Except in Punjab and Haryana, **direct recruitment takes place to the rank of Constable, Sub-Inspector and Deputy Superintendent of Police**.
- In Punjab direct recruitment does not take place to the rank of Sub Inspector, but to the rank of Assistant Sub-Inspector. There are also few direct appointments to the post of the Inspector in Punjab.
- Whether direct recruitment should be made only at the lowest level and each higher rank should be filled by promotion, or the present system of recruitment at various levels should continue.
- When the present system of recruitment India was introduced, the standard of general literary in the country was very low.
- If at the time a high educational standard had been fixed for the constable, it would have been impossible to get sufficient recruits on the party and status offered, it was difficult even to get a sufficient number of candidates who had passed the middle class examination for recruitment as Constables. Hence, the educational standard required of a constable was bare literacy, and mere stress was laid on physical attributes.
- Moreover, the Constable of those days was looked upon as a sort of automation possessed of a good physique and trained to carry out orders in a mechanical manner without using his own intelligence or discretion.
- This worked more or less satisfactory up to the 1920s but generally as the educational standards in the country standard rising, it was found not enough to make a good Police constable.
- So a higher educational standard was prescribed. When India attained independence, in most of the states the minimum educational standard required of a constable was the passing of the middle class, though matriculates were preferred in many states.
- In most of the countries of the world, two or three recruitment has been adopted.

- **Only in England, recruitment is confined to the level of Constable**, and the position has become so traditional in England now that it is impossible to change it and introduce recruitment at different levels.
- The Royal Commission of naturally was bounded by the Government decision that recruitment must be at the lowest level, but it expressed grave concern with the fact that even amongst Chief Constables there were very few University Graduates.
- The Commission made various recommendations designed to improve the educational standard of men after recruitment.
- For people who had qualified at the Grammar school the Commission recommended that the constable should be eligible for promotion to the next higher rank of Sergeant (Head Constable in India) within three years of joining the cadet course.
- The Commission also felt that if this prospect of quick promotion to higher ranks were held out, it would be possible to attract university graduates in the lower rank also.
- In other words, whilst the Commission's hands were bound by the Government decision that there should be no recruitment at any level higher than that of the constable, the Commission was not at all satisfied with the quality of men, the Police force was getting both at the lowest level and (by promotion) at higher levels to lead the force. Therefore, it is desirable that recruitment should be kept open at three levels.
- They are Constable, Assistant Sub-Inspector of Sub-Inspector and Assistant Commissioner of Police/Deputy superintendent of Police/Assistant superintendent of Police.